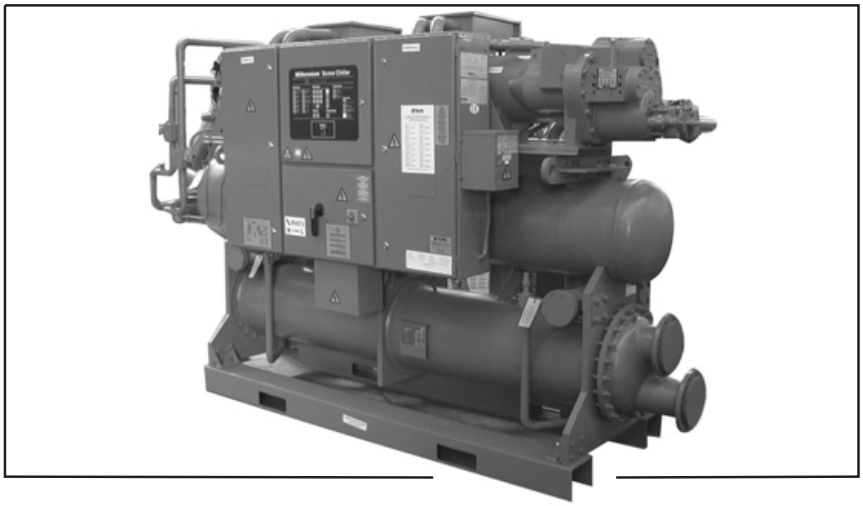
# YCWS *Millennium*™ WATER COOLED SCREW CHILLER

## R407C REFRIGERANT

## COOLING CAPACITIES 357 kW to 612 kW



York YCWS Water Cooled Screw Chillers are a compact design suitable for chilled water cooling. Semi-hermetic twin helical screw compressors are provided to ensure high operational efficiencies and reliable performance.

They are designed to be located in a plant room and require a cooling tower or dry cooler for heat rejection.

### CONTENTS


**Specification**
**Accessories and Options**
**Operating Limitations**
**Refrigeration Flow Diagram**
**Selection Guide**
**Cooling Capacities**
**Fouling Factors**
**Pressure Drop Graphs**
**Physical Data**
**Electrical Data**
**Dimensions**
**Electrical Connections**
**Clearances**
**Weight Distribution**


### AVAILABLE MODELS & NOMINAL COOLING CAPACITIES TABLE 1

| Model | 0395SB | 0455SB | 0515SB | 0585SB | 0675SB |
|---|---|---|---|---|---|
| Cooling Capacity (kW) | 357 | 411 | 462 | 540 | 612 |

Cooling capacities at 7 °C leaving chilled liquid temperature and 35 °C condenser water temperature.

| FEATURES | BENEFITS |
|---|---|
| Manufactured to ISO 9001/EN 29001. | High standard of quality control. |
| High efficiency industrial type semi-hermetic twin helical screw compressors. | Energy efficient, long life, reliable compressor. |
| Separate power and control compartments with lockable doors and emergency stop device. | Operator safety considerations. |
| Power compartment optional door interlocked isolators. | Operator safety convenience. |
| Star/Delta compressor starter. | Reduced starting current. |
| Microprocessor control with visual display of temperatures, pressures, motor current, operating hours and number of starts. | System data logging and temperature reset capability. Fault diagnostics. Energy management. |
| Fuzzy logic. | Maximise capacity control. |
| Suction line heat exchanger. | Maximises chiller capacity and efficiency. |
| Unit remote alarm contacts. | Warning notification. |
| Optional remote water temperature reset. | Improves operating efficiency. |
| Building Management System interface. | For central data logging and single point system monitoring and control. |

## SPECIFICATION

**General**
YCWS models shall be completely assembled with all interconnecting refrigerant piping and internal wiring, ready for field installation. The unit shall be pressure tested, evacuated, and fully factory charged with refrigerant and oil in each of the independent refrigerant circuits.

All units have a final overspray paint after assembly.

**Compressors**
Each compressor shall be direct drive, semi-hermetic, rotary twin screw type and include the following items:

- Two screw rotors, with asymmetric profiles, manufactured from forged steel.
- A cast iron compressor housing precision machined to provide optimal clearance for the rotors.
- The entire compressor, from suction to discharge shall have a design working pressure of 31 barg.
- Capacity Control: The compressors shall start at the minimum load position and provide a capacity control range from 100% to 10% of the full chiller load using a continuous function slide valve. A microprocessor controlled output pressure regulating capacity control valve shall be supplied to command compressor capacity independent of control valve input pressure and to balance the compressor capacity with the cooling load.

- An automatic spring return of capacity control valve to the minimum load position to ensure compressor starting at minimum motor load.
- An internal discharge check valve to prevent rotor backspin upon shutdown.
- An acoustically tuned, internal discharge muffler to minimise noise at the source, while optimising flow for maximum performance.
- Discharge and suction shut-off service valves.
- A reliable suction gas cooled high efficiency, accessible hermetic motor with redundant overload protection using both thermistor and current overload protection.
- A suction gas screen and serviceable, 0.5 micron full flow oil filter within the compressor housing.
- A 350 W compressor body heater.

**Oil Separator**
Oil separators with a design working pressure of 31 barg shall be the high efficiency, augmented gas impingement type to maximise oil extraction without fragile media to break down.

**Oil Cooling**
Compressor oil cooling shall be provided by refrigerant liquid, which will be injected into the rotor suction when the temperature setpoint is exceeded.

**Cooler**
The dual refrigerant circuit cooler will be a shell and tube type direct expansion evaporator. Each of the refrigerant circuits shall consist of 2 passes with the chilled liquid circulating back and forth across the tubes from one end to the other.

The shell design working pressure shall be 10 barg, and 31 barg for the tubes.

A removable head shall be provided for access to internally enhanced, seamless, copper tubes. Water vent and drain connections shall be included. The cooler will be insulated with 19 mm flexible closed-cell foam.

**Suction Line Heat Exchanger**
Each refrigerant circuit utilises a refrigerant to refrigerant, compact, shell and tube type suction line heat exchanger to maximise chiller capacity and efficiency by subcooling liquid refrigerant delivered to the expansion valve and superheating suction gas delivered to the compressor. The design working pressure shall be 31 barg. The exchanger shall be constructed in accordance with applicable pressure vessel safety code.

**Condenser**
The dual refrigerant circuit water-cooled condenser shall be a cleanable shell and tube type with seamless external finned 19mm OD copper tubes rolled into tube sheets. It shall have removable steel water heads. The design working pressure on the waterside shall be 10 barg. The relief valve refrigerant design working pressure shall be 31 barg.

**Refrigerant Circuits**
An independent refrigerant circuit shall be provided per compressor. Liquid line components shall include: manual shut-off valve with charging port, high absorption removable core filter-drier, solenoid valve, sight glass with moisture indicator, and thermostatic expansion valve. Suction lines shall be covered with closed-cell insulation.

**Power and Control Panels**
All controls and motor starting equipment necessary for unit operation shall be factory wired and function tested. The panel enclosures shall be designed to IP32 and be manufactured from powder painted galvanised steel.

The Power and Control Panel shall be divided into a power section for each electrical system, a common input section and a control section. All sections shall have a separate hinged, latched, and gasket sealed door.

Each power section shall contain:

Compressor starting contactors, control circuit serving compressor capacity control, compressor contactor coils and compressor motor overloads. The compressor motor overloads contain current transformers which sense each phase, as an input to the microprocessor, to protect compressor motors from damage due to: low input current, high input current, unbalanced current, single phasing, phase reversal, and compressor locked rotor.

The common input section shall contain:

The control supply transformer, customer relay board and control circuit switch disconnect / emergency stop device.

The control section shall contain:

On/Off toggle switch, microcomputer keypad and display, microprocessor board, I/O expansion board, relay boards and power supply board.

**Microprocessor Controls**
**Fuzzy Logic** control will be incorporated in the YCWS range of chillers. Fuzzy logic allows the control system to monitor several key variables to provide tighter, more stable, chilled water temperature control. The control system monitors the leaving chilled water temperature to track where it has been, where it is now, how fast it is moving, and accurately adjusts chiller operation in anticipation of expected performance to minimise hunting and save energy.

The microprocessor shall have the following functions and displays:

- A liquid crystal 40 character display with text provided on two lines and light emitting diode backlighting for outdoor viewing.
- A colour coded, 35 button, sealed keypad with sections for Display, Entry, Setpoints, Clock, Print, Program and Unit On/Off switch.

The standard controls shall include: automatic pump down, run signal contacts, demand load limit from external building automation system input, remote reset liquid temperature reset input, unit alarm contacts, chilled liquid pump control, automatic reset after power failure, automatic system optimisation to match operating conditions, software stored in non-volatile memory (EPROM) to eliminate chiller failure due to AC power failure.

The microprocessor can be directly connected to a YORK ISN Building Automation System via the standard on-board RS485 communication port. This option also provides open system compatibility with other communications networks.

Programmed Setpoints shall be retained in a lithium battery backed RTC memory for a minimum of 5 years.

***DISPLAY –*** In Metric (°C and barg) or English (°F and psig) units. For each circuit, the following items shall be displayed:

- Entering and leaving chilled liquid temperature.
- Day, date and time. Daily start/stop times. Holiday and Manual Override status.
- Compressor operating hours and starts. Automatic or manual lead/lag. Lead compressor identification.
- Run permissive status. No cooling load condition. Compressor run status.
- Anti-recycle timer and anti-coincident start timer status per compressor.
- System suction (and suction superheat), discharge, and oil pressures and temperatures.
- Percent full load compressor motor current. Compressor capacity control valve input steps.
- Cut-out status and set-points for: entering chilled liquid temperature., low suction pressure, high discharge pressure and temperature, high oil temperature, high and low current, and low leaving liquid temperature.
- Unloading limit setpoints for high discharge pressure and compressor motor current.
- Liquid pull-down rate sensitivity (0.3°C to 3°C/minute in 0.05°C increments).
- Status of load and unload timers, chilled liquid pump.
- "Out of range" message.
- Up to 6 fault shut down conditions.

***ENTRY –*** Enter set point changes, cancel inputs, advance day, and change AM/PM.

***SET POINTS –*** Chilled liquid temperature, chilled liquid range, remote reset temperature range.

***CLOCK –*** Time, daily or holiday start/stop schedule, manual override for servicing.

***PRINT –*** Operating data or system fault shutdown history for last six faults, printouts via a separate printer (by others).

***PROGRAM –*** Low leaving liquid temperature cutout, 300 to 600 second anti-recycle timer, lag compressor start time delay, average motor current unload point, liquid temperature set-point reset signal from YORK ISN or building automation system (by others) via:

- Pulse width modulated (PWM) input for up to 22°C total reset as standard.
- *Optional* Building Automation System interface input card for up to 11°C reset using a 4 to 20 mA, 0 to 10 Vdc input, or discrete reset input.
- [**NOTE**: The Standard microprocessor can be directly connected to a YORK ISN Building Automation System via the standard on-board RS485 communication port. This Option also provides open system compatibility with other communications networks (BACNET™ & LONMARK™) via interface through standard onboard 485 or 232 port and an external YorkTalk Translator.]
- Additional functions (password protected) for programming by a qualified service technician:
- Cut-outs for low suction pressure, high discharge pressure, high oil temperature.
- High discharge pressure unload setpoint.
- Compressor motor current percent limit.

**Motor Protection**
The microprocessor motor protection provides high current protection to ensure that the motor is not damaged due to voltage, excess refrigerant or other problems that could cause excessive motor current.

The microprocessor also provides low motor current protection when it senses a motor current of less than 10% FLA.

A motor protector module provides thermal and current motor overload protection. The module also protects against phase to phase current imbalance, over current, under current and phase rotation.

# ACCESSORIES AND OPTIONS

## ELECTRICAL OPTIONS

**Power Supply Connection**
Units are available with either single point or multi point power supply connections:

**Single Point Power Supply Connection** - One field provided 380/400 V, 3Ø, 50 Hz supply to the unit with circuit protection. Field connections to factory provided door interlocked non-fused disconnect switch in the common input section. Internal branch door interlocked circuit breakers or fuses for each circuit in the two power panels. The control system supply is derived internally.

**Multi Point Power Supply Connection** - Two field provided 380/400 V, 3Ø, 50 Hz supplies to the unit with circuit protection. Field connections to factory provided door interlocked circuit breakers in each of the two Power Panels. A field provided 380/400 V, 2Ø, 50 Hz supply is required for the control system.

**Building Automation System (BAS) / EMS Interface**
Provides a means to reset the leaving chilled liquid temperature and/or percent full load amps (current limiting) from the BAS / EMS (Factory Mounted):

Printed circuit board to accept 4 to 20 mA, 0 to 10 Vdc, or dry contact closure input from the BAS / EMS.

***Note:*** A YORK ISN Building Automation System can provide a Pulse Width Modulated (PWM) signal direct to the standard control panel via the standard on-board RS485 port.

**Multi-unit Sequence Control**
A factory mounted Sequencing Control Centre to manage sequencing control of up to eight chillers in parallel based on mixed liquid temperature (interconnecting wiring by others).

## PRESSURE VESSEL CODES

Coolers and condensers can be supplied in conformance with the following pressure vessel codes:

A.S.M.E.; T.Ue.V. (Germany & Austria); I.S.P.E.S.L. (Italy); D.R.I.R.E. (France); U.D.T. (Poland); C.F.C. (Netherlands); S.A.Q. (Sweden).

## ACCESSORIES

**Anti-Vibration Mounts**
Neoprene pads are supplied as standard. Optional 25 mm deflection, open spring, anti-vibration mounts with levelling screws and fixing holes available as an option.

**Flow Switch**
Switch with 1 inch IPS thread suitable for 10 barg DWP and having gold contacts for low voltage/current, to protect unit from loss of water flow. Supplied loose for field installation.

**Flange Kits**
Factory fitted flanges to convert grooved cooler/condenser water nozzles to flanged connections. Available in weld or victaulic style with companion flanges for field mounting.

**Mechanical Gauge Kit**
Factory fitted mechanical gauges for display of suction and discharge pressures, one complete set per system.

**Language LCD and Keypad**
Standard display language and keypad is English. French, German, Italian and Spanish are available as an option.

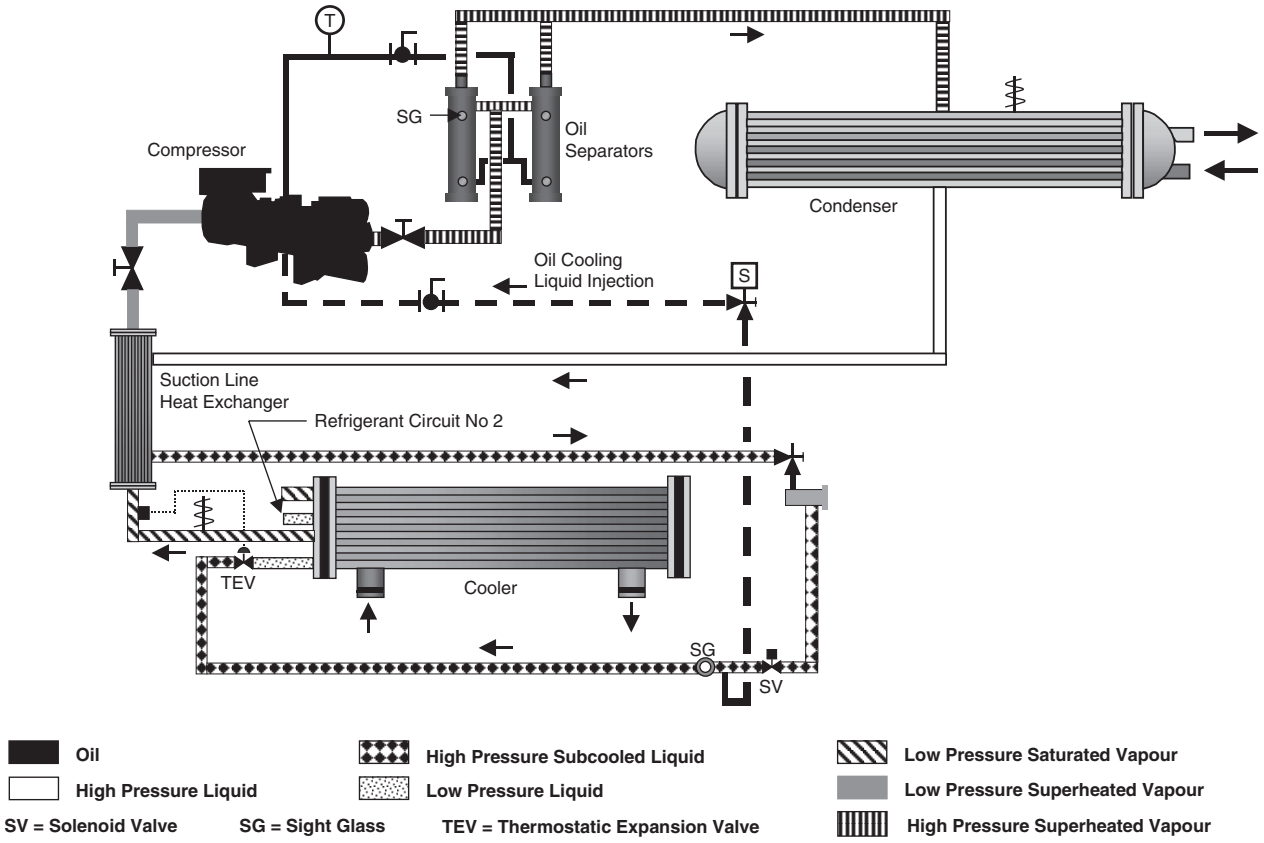
**Printer**
Hand held printer for obtaining printout of unit operating data and history data.

## TABLE 2 OPERATING LIMITATIONS

| Model YCWS | | | 0395SB | | 0455SB | | 0515SB | | 0585SB | | 0675SB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| Chilled Liquid | Liquid outlet temperature | °C | 4.5 to 15 | | | | | | | | | |
| | Liquid outlet temperature range | °C | 3 to 8 | | | | | | | | | |
| | Flow rate | l/s | 8.6 | 42.6 | 8.6 | 42.6 | 8.6 | 42.6 | 8.6 | 42.6 | 8.6 | 42.6 |
| | Pressure drop | kPa | 10.8 | 236.3 | 10.8 | 244.2 | 10.8 | 244.2 | 5.9 | 117.7 | 5.9 | 117.7 |
| | Maximum working pressure | barg | 10 | | | | | | | | | |
| Cooling Liquid | Liquid outlet temperature | °C | 25 to 52 | | | | | | | | | |
| | Liquid outlet temperature range | °C | Limited by condenser water flow | | | | | | | | | |
| | Flow rate | l/s | 11.7 | 42.9 | 18.0 | 50.5 | 18.0 | 50.5 | 18.9 | 75.8 | 18.9 | 75.8 |
| | Pressure drop | kPa | 11.7 | 94.2 | 14.9 | 101.6 | 14.9 | 101.6 | 10.2 | 135.7 | 10.2 | 135.7 |
| | Maximum working pressure | barg | 10 | | | | | | | | | |
| Refrigerant System High pressure side | | barg | 31 | | | | | | | | | |
| Power supply voltage 400 V, 3 Ø, 50 Hz (nominal) | | V | 342 to 440 | | | | | | | | | |
| Recommended system water volume(1) | | l | 1150 | | 1320 | | 1480 | | 1730 | | 1960 | |

(1) Table shows minimum water volume of system

## FIGURE 1 REFRIGERATION FLOW DIAGRAM




Low pressure liquid refrigerant enters the cooler tubes and is evaporated and superheated by the heat energy absorbed from the chilled liquid passing through the cooler shell. Low pressure vapour enters the compressor where pressure and superheat are increased. High pressure vapour is passed through the oil separator where compressor oil is removed and recirculated to the compressor. High pressure superheated refrigerant enters the condenser shell where heat is rejected to the condenser water passing through the tubes. The fully condensed and subcooled liquid leaves the condenser and enters the expansion valve, where pressure reduction and further cooling takes place. The low pressure liquid refrigerant then returns to the cooler. Each refrigerant circuit utilises a refrigerant to refrigerant suction line heat exchanger to maximise chiller capacity and efficiency by subcooling liquid refrigerant delivered to the expansion valve and superheating suction gas delivered to the compressor.

**DATA REQUIRED**
To select a YORK YCWS chiller the following information is required:

1. Design cooling capacity.
2. Chilled liquid entering and leaving temperatures.
3. Cooling water entering and leaving temperature.
4. Chilled liquid flow (l/s) if one of the temperatures in (2) is unknown.
5. Cooling water flow (l/s) if one of the temperatures in (3) is unknown.
6. Cooler and condenser fouling factor.

Determine the capacity from:

Cooling Capacity (kW) = Range (°C) x chilled liquid flow (l/s) x 4.18 (kj/kg°C)

Determine the heat rejection from:

Heat Rejection (kW) = Range (°C) x cooling water flow (l/s) x 4.18 (kj/kg°C)

**YCWS SAMPLE SELECTION**
A water cooled chiller is required chiller to cool 21 l/s of water from 11°C to 6°C. The condenser leaving water temperature is 35°C with a 5°C range.

The required fouling factor is 0.088m² °C/kW for cooler and condenser.

Find the required unit size, cooling capacity, kW input and the cooler and condenser pressure drop.

1. Chilled water range = 11 - 6 = 5°C
2. Cooling Capacity (kW) = Range (°C) x chilled water (l/s)x 4.18
   = 5 x 21 x 4.18 = 438.9 kW
3. Select a chiller model from capacity Table 4.
   Model YCWS0515SB has a capacity of 450.6 kW.
4. Model YCWS0515SB has a power input of 129.9 kW.
5. The fouling factor required in the cooler introduces a capacity factor of 0.987 and a kW input factor of 0.995 (see Table 3).

   The fouling factor required in the condenser introduces a capacity factor of 0.987 and a kW input factor of 1.023 (see Table 3).

   Net Cooling Capacity = 450.6 x 0.987 x 0.987 = 438.9 kW
   Net kW input = 129.9 x 0.995 x 1.023 = 132.2 kW
6. The heat rejection at the required fouling conditions will be 438.9 + (132.2 x 0.95*) = 564.5 kW
   *5% radiation heat loss through compressor and motor housing.
7. The chilled water flow required to satisfy the capacity corrected for the fouling conditions

   $\frac{\text{Actual capacity (kW)}}{\text{Range (°C) x 4.18}} = \frac{438.9}{20.9} = 21.0$ l/s
8. The cooler water pressure drop = 60 kPa (see Figure 2).
9. The condenser water flow:

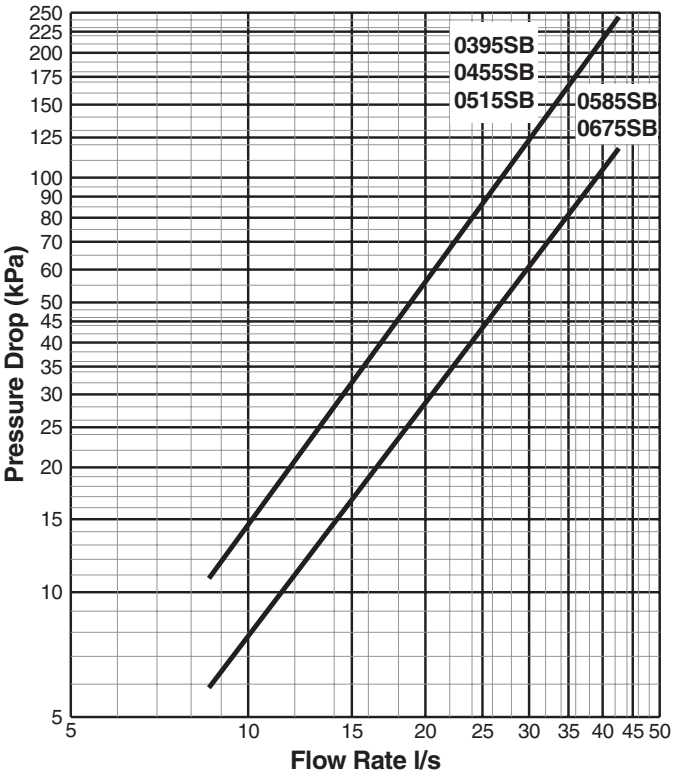
   $\frac{\text{Heat rejection (kW)}}{\text{Range (°C) x 4.18}} = \frac{564.5}{20.9} = 27.0$ l/s
10. The condenser water pressure drop = 32 kPa (see Figure 3).

**FOULING FACTORS** — TABLE 3

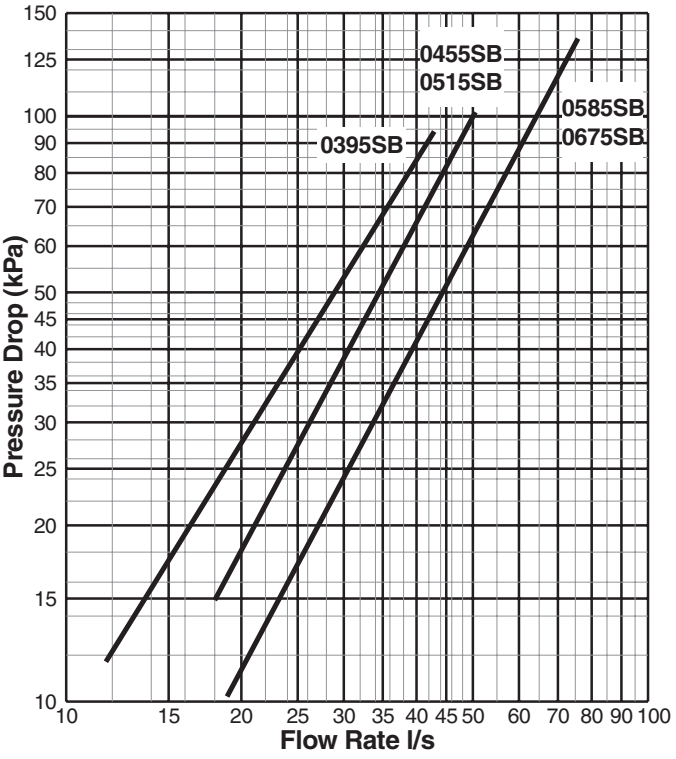
| COOLER | | |
|---|---|---|
| Fouling Factor m² °C/kW | Capacity Factor | Comp. Input Factor |
| 0.044 | 1.000 | 1.000 |
| 0.088 | 0.987 | 0.995 |
| 0.176 | 0.964 | 0.985 |
| 0.352 | 0.915 | 0.962 |

| CONDENSER | | |
|---|---|---|
| Fouling Factor m² °C/kW | Capacity Factor | Comp. Input Factor |
| 0.044 | 1.000 | 1.000 |
| 0.088 | 0.987 | 1.023 |
| 0.176 | 0.955 | 1.068 |
| 0.308 | 0.910 | 1.135 |

**COOLER PRESSURE DROP** — FIGURE 2




**CONDENSER PRESSURE DROP** — FIGURE 3



## TABLE 4 COOLING CAPACITIES

| Model YCWS | LCLT °C | Condenser Leaving Water Temperature °C | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | | 35 | | | 40 | | | 45 | | | 50 | | | 52 | | |
| | | Cool kW | Power kW | HR kW | Cool kW | Power kW | HR kW | Cool kW | Power kW | HR kW | Cool kW | Power kW | HR kW | Cool kW | Power kW | HR kW | Cool kW | Power kW | HR kW |
| 0395SB | 4.5 | 350.5 | 86.5 | 432.7 | 323.5 | 96.0 | 414.6 | 296.4 | 105.4 | 396.6 | 269.4 | 114.9 | 378.5 | 242.4 | 124.3 | 360.4 | 231.5 | 128.1 | 353.2 |
| | 5 | 356.8 | 86.5 | 439.0 | 330.1 | 96.0 | 421.2 | 303.4 | 105.4 | 403.5 | 276.6 | 114.9 | 385.8 | 249.9 | 124.3 | 368.1 | 239.3 | 128.1 | 361.0 |
| | 6 | 369.3 | 86.6 | 451.6 | 343.3 | 96.0 | 434.5 | 317.2 | 105.5 | 417.4 | 291.2 | 115.0 | 400.4 | 265.1 | 124.4 | 383.3 | 254.7 | 128.2 | 376.5 |
| | 7 | 381.9 | 86.6 | 464.1 | 356.5 | 96.1 | 447.7 | 331.1 | 105.6 | 431.4 | 305.7 | 115.0 | 415.0 | 280.3 | 124.5 | 398.6 | 270.1 | 128.3 | 392.0 |
| | 8 | 394.4 | 86.7 | 476.7 | 369.7 | 96.1 | 461.0 | 344.9 | 105.6 | 445.3 | 320.2 | 115.1 | 429.5 | 295.4 | 124.6 | 413.8 | 285.5 | 128.4 | 407.5 |
| | 9 | 407.0 | 86.7 | 489.3 | 382.9 | 96.2 | 474.3 | 358.8 | 105.7 | 459.2 | 334.7 | 115.2 | 444.1 | 310.6 | 124.7 | 429.1 | 301.0 | 128.5 | 423.0 |
| | 10 | 419.5 | 86.7 | 501.9 | 396.1 | 96.3 | 487.5 | 372.6 | 105.8 | 473.1 | 349.2 | 115.3 | 458.7 | 325.8 | 124.8 | 444.3 | 316.4 | 128.6 | 438.5 |
| | 11 | 432.1 | 86.8 | 514.5 | 409.3 | 96.3 | 500.8 | 386.5 | 105.8 | 487.0 | 363.7 | 115.4 | 473.3 | 340.9 | 124.9 | 459.5 | 331.8 | 128.7 | 454.1 |
| | 12 | 444.6 | 86.8 | 527.1 | 422.5 | 96.4 | 514.0 | 400.3 | 105.9 | 500.9 | 378.2 | 115.4 | 487.9 | 356.1 | 125.0 | 474.8 | 347.2 | 128.8 | 469.6 |
| | 13 | 457.2 | 86.9 | 539.7 | 435.7 | 96.4 | 527.3 | 414.2 | 106.0 | 514.9 | 392.7 | 115.5 | 502.5 | 371.2 | 125.0 | 490.0 | 362.7 | 128.9 | 485.1 |
| | 14 | 469.7 | 86.9 | 552.3 | 448.9 | 96.5 | 540.5 | 428.1 | 106.0 | 528.8 | 407.2 | 115.6 | 517.0 | 386.4 | 125.1 | 505.3 | 378.1 | 129.0 | 500.6 |
| | 15 | 482.3 | 87.0 | 564.9 | 462.1 | 96.5 | 553.8 | 441.9 | 106.1 | 542.7 | 421.7 | 115.7 | 531.6 | 401.6 | 125.2 | 520.5 | 393.5 | 129.1 | 516.1 |
| 0455SB | 4.5 | 408.6 | 100.4 | 504.0 | 380.1 | 112.7 | 487.2 | 351.6 | 125.0 | 470.4 | 323.1 | 137.4 | 453.6 | 294.6 | 149.7 | 436.8 | 283.2 | 154.6 | 430.1 |
| | 5 | 414.5 | 100.5 | 510.0 | 386.3 | 112.8 | 493.4 | 358.0 | 125.1 | 476.9 | 329.8 | 137.5 | 460.4 | 301.6 | 149.8 | 443.8 | 290.3 | 154.7 | 437.2 |
| | 6 | 426.3 | 100.6 | 521.9 | 398.6 | 113.0 | 505.9 | 370.8 | 125.3 | 489.9 | 343.1 | 137.6 | 473.9 | 315.4 | 150.0 | 457.9 | 304.3 | 154.9 | 451.5 |
| | 7 | 438.0 | 100.8 | 533.8 | 410.8 | 113.1 | 518.3 | 383.6 | 125.5 | 502.8 | 356.4 | 137.8 | 487.4 | 329.3 | 150.1 | 471.9 | 318.4 | 155.1 | 465.7 |
| | 8 | 449.8 | 100.9 | 545.6 | 423.1 | 113.3 | 530.7 | 396.4 | 125.6 | 515.8 | 369.8 | 138.0 | 500.9 | 343.1 | 150.3 | 485.9 | 332.4 | 155.3 | 480.0 |
| | 9 | 461.5 | 101.1 | 557.5 | 435.4 | 113.4 | 543.1 | 409.2 | 125.8 | 528.7 | 383.1 | 138.2 | 514.3 | 357.0 | 150.5 | 500.0 | 346.5 | 155.5 | 494.2 |
| | 10 | 473.3 | 101.2 | 569.4 | 447.7 | 113.6 | 555.6 | 422.0 | 126.0 | 541.7 | 396.4 | 138.3 | 527.8 | 370.8 | 150.7 | 514.0 | 360.6 | 155.7 | 508.4 |
| | 11 | 485.0 | 101.4 | 581.3 | 459.9 | 113.7 | 568.0 | 434.8 | 126.1 | 554.7 | 409.8 | 138.5 | 541.3 | 384.7 | 150.9 | 528.0 | 374.6 | 155.8 | 522.7 |
| | 12 | 496.8 | 101.5 | 593.2 | 472.2 | 113.9 | 580.4 | 447.6 | 126.3 | 567.6 | 423.1 | 138.7 | 554.8 | 398.5 | 151.1 | 542.0 | 388.7 | 156.0 | 536.9 |
| | 13 | 508.5 | 101.6 | 605.1 | 484.5 | 114.0 | 592.8 | 460.4 | 126.5 | 580.6 | 436.4 | 138.9 | 568.3 | 412.4 | 151.3 | 556.1 | 402.8 | 156.2 | 551.2 |
| | 14 | 520.3 | 101.8 | 617.0 | 496.8 | 114.2 | 605.2 | 473.2 | 126.6 | 593.5 | 449.7 | 139.0 | 581.8 | 426.2 | 151.4 | 570.1 | 416.8 | 156.4 | 565.4 |
| | 15 | 532.0 | 101.9 | 628.9 | 509.0 | 114.4 | 617.7 | 486.0 | 126.8 | 606.5 | 463.1 | 139.2 | 595.3 | 440.1 | 151.6 | 584.1 | 430.9 | 156.6 | 579.6 |
| 0515SB | 4.5 | 463.5 | 114.3 | 572.1 | 433.8 | 129.5 | 556.8 | 404.1 | 144.7 | 541.5 | 374.4 | 159.9 | 526.2 | 344.6 | 175.1 | 510.9 | 332.7 | 181.1 | 504.8 |
| | 5 | 468.9 | 114.4 | 577.7 | 439.4 | 129.6 | 562.6 | 409.9 | 144.8 | 547.5 | 380.4 | 160.0 | 532.4 | 350.8 | 175.2 | 517.3 | 339.0 | 181.3 | 511.2 |
| | 6 | 479.8 | 114.7 | 588.7 | 450.6 | 129.9 | 574.0 | 421.5 | 145.1 | 559.3 | 392.4 | 160.3 | 544.6 | 363.2 | 175.5 | 529.9 | 351.6 | 181.6 | 524.1 |
| | 7 | 490.6 | 114.9 | 599.8 | 461.9 | 130.1 | 585.5 | 433.1 | 145.4 | 571.2 | 404.4 | 160.6 | 556.9 | 375.6 | 175.8 | 542.6 | 364.1 | 181.9 | 536.9 |
| | 8 | 501.4 | 115.2 | 610.9 | 473.1 | 130.4 | 597.0 | 444.7 | 145.6 | 583.1 | 416.4 | 160.8 | 569.2 | 388.0 | 176.1 | 555.3 | 376.7 | 182.1 | 549.7 |
| | 9 | 512.3 | 115.4 | 621.9 | 484.3 | 130.7 | 608.4 | 456.4 | 145.9 | 594.9 | 428.4 | 161.1 | 581.4 | 400.4 | 176.3 | 567.9 | 389.2 | 182.4 | 562.5 |
| | 10 | 523.1 | 115.7 | 633.0 | 495.5 | 130.9 | 619.9 | 468.0 | 146.1 | 606.8 | 440.4 | 161.4 | 593.7 | 412.8 | 176.6 | 580.6 | 401.8 | 182.7 | 575.4 |
| | 11 | 533.9 | 115.9 | 644.1 | 506.8 | 131.2 | 631.4 | 479.6 | 146.4 | 618.7 | 452.4 | 161.7 | 606.0 | 425.2 | 176.9 | 593.3 | 414.4 | 183.0 | 588.2 |
| | 12 | 544.8 | 116.2 | 655.1 | 518.0 | 131.4 | 642.8 | 491.2 | 146.7 | 630.5 | 464.4 | 161.9 | 618.2 | 437.6 | 177.2 | 605.9 | 426.9 | 183.3 | 601.0 |
| | 13 | 555.6 | 116.4 | 666.2 | 529.2 | 131.7 | 654.3 | 502.8 | 146.9 | 642.4 | 476.4 | 162.2 | 630.5 | 450.0 | 177.5 | 618.6 | 439.5 | 183.6 | 613.9 |
| | 14 | 566.4 | 116.7 | 677.3 | 540.4 | 131.9 | 665.8 | 514.4 | 147.2 | 654.3 | 488.4 | 162.5 | 642.8 | 462.4 | 177.7 | 631.3 | 452.0 | 183.9 | 626.7 |
| | 15 | 577.3 | 116.9 | 688.3 | 551.7 | 132.2 | 677.2 | 526.1 | 147.5 | 666.1 | 500.4 | 162.7 | 655.0 | 474.8 | 178.0 | 644.0 | 464.6 | 184.1 | 639.5 |
| 0585SB | 4.5 | 530.7 | 119.0 | 643.8 | 492.5 | 135.9 | 621.6 | 449.3 | 152.7 | 594.4 | 406.1 | 169.6 | 567.2 | 362.9 | 186.5 | 540.0 | 345.6 | 193.2 | 529.2 |
| | 5 | 540.3 | 119.1 | 622.4 | 502.0 | 136.0 | 631.2 | 458.6 | 152.9 | 603.9 | 415.3 | 169.8 | 576.5 | 371.9 | 186.6 | 549.2 | 354.6 | 193.4 | 538.3 |
| | 6 | 559.3 | 119.4 | 641.6 | 520.9 | 136.3 | 650.3 | 477.3 | 153.2 | 622.7 | 433.6 | 170.0 | 595.1 | 390.0 | 186.9 | 567.5 | 372.5 | 193.7 | 556.5 |
| | 7 | 578.3 | 119.6 | 660.6 | 539.8 | 136.5 | 669.5 | 495.9 | 153.4 | 641.6 | 452.0 | 170.3 | 613.8 | 408.0 | 187.2 | 585.9 | 390.5 | 194.0 | 574.7 |
| | 8 | 597.4 | 119.9 | 679.8 | 558.8 | 136.8 | 688.7 | 514.5 | 153.7 | 660.5 | 470.3 | 170.6 | 632.4 | 426.1 | 187.5 | 604.2 | 408.4 | 194.3 | 592.9 |
| | 9 | 616.4 | 120.1 | 698.8 | 577.7 | 137.0 | 707.9 | 533.2 | 154.0 | 679.4 | 488.7 | 170.9 | 651.0 | 444.1 | 187.8 | 622.5 | 426.3 | 194.6 | 611.2 |
| | 10 | 635.5 | 120.4 | 717.8 | 596.6 | 137.3 | 727.0 | 551.8 | 154.2 | 698.3 | 507.0 | 171.2 | 669.6 | 462.2 | 188.1 | 640.9 | 444.3 | 194.9 | 629.4 |
| | 11 | 654.5 | 120.6 | 737.0 | 615.5 | 137.6 | 746.2 | 570.4 | 154.5 | 717.2 | 525.4 | 171.4 | 688.2 | 480.3 | 188.4 | 659.2 | 462.2 | 195.2 | 647.6 |
| | 12 | 673.6 | 120.9 | 756.0 | 634.5 | 137.8 | 765.4 | 589.1 | 154.8 | 736.1 | 543.7 | 171.7 | 706.8 | 498.3 | 188.7 | 677.5 | 480.2 | 195.5 | 665.8 |
| | 13 | 692.6 | 121.1 | 775.2 | 653.4 | 138.1 | 784.6 | 607.7 | 155.0 | 755.0 | 562.0 | 172.0 | 725.4 | 516.4 | 189.0 | 695.9 | 498.1 | 195.7 | 684.1 |
| | 14 | 711.6 | 121.3 | 794.2 | 672.3 | 138.3 | 803.7 | 626.4 | 155.3 | 773.9 | 580.4 | 172.3 | 744.1 | 534.4 | 189.3 | 714.2 | 516.0 | 196.0 | 702.3 |
| | 15 | 730.7 | 121.6 | 813.3 | 691.3 | 138.6 | 822.9 | 645.0 | 155.6 | 792.8 | 598.7 | 172.6 | 762.7 | 552.5 | 189.5 | 732.6 | 534.0 | 196.3 | 720.5 |
| 0675SB | 4.5 | 602.2 | 123.7 | 719.8 | 546.1 | 142.3 | 681.2 | 489.9 | 160.8 | 642.7 | 433.8 | 179.3 | 604.2 | 377.6 | 197.9 | 565.6 | 355.2 | 205.3 | 550.2 |
| | 5 | 615.9 | 123.8 | 733.6 | 559.3 | 142.4 | 694.6 | 502.6 | 160.9 | 655.5 | 446.0 | 179.5 | 616.5 | 389.4 | 198.0 | 577.5 | 366.7 | 205.4 | 561.9 |
| | 6 | 643.3 | 124.1 | 761.2 | 585.7 | 142.7 | 721.2 | 528.1 | 161.2 | 681.2 | 470.5 | 179.8 | 641.2 | 412.9 | 198.3 | 601.3 | 389.8 | 205.8 | 585.3 |
| | 7 | 670.6 | 124.3 | 788.7 | 612.1 | 142.9 | 747.8 | 553.5 | 161.5 | 706.9 | 494.9 | 180.1 | 666.0 | 436.4 | 198.6 | 625.1 | 412.9 | 206.1 | 608.7 |
| | 8 | 698.0 | 124.6 | 816.3 | 638.4 | 143.2 | 774.5 | 578.9 | 161.8 | 732.6 | 519.4 | 180.3 | 690.7 | 459.9 | 198.9 | 648.8 | 436.0 | 206.4 | 632.1 |
| | 9 | 725.3 | 124.8 | 843.9 | 664.8 | 143.4 | 801.1 | 604.3 | 162.0 | 758.3 | 543.8 | 180.6 | 715.4 | 483.3 | 199.2 | 672.6 | 459.1 | 206.7 | 655.5 |
| | 10 | 752.7 | 125.1 | 871.5 | 691.2 | 143.7 | 827.7 | 629.8 | 162.3 | 783.9 | 568.3 | 180.9 | 740.2 | 506.8 | 199.5 | 696.4 | 482.3 | 207.0 | 678.9 |
| | 11 | 780.0 | 125.3 | 899.1 | 717.6 | 143.9 | 854.4 | 655.2 | 162.6 | 809.6 | 592.8 | 181.2 | 764.9 | 530.3 | 199.9 | 720.2 | 505.4 | 207.3 | 702.3 |
| | 12 | 807.4 | 125.5 | 926.7 | 744.0 | 144.2 | 881.0 | 680.6 | 162.9 | 835.3 | 617.2 | 181.5 | 789.6 | 553.8 | 200.2 | 744.0 | 528.5 | 207.6 | 725.7 |
| | 13 | 834.7 | 125.8 | 954.2 | 770.4 | 144.5 | 907.6 | 706.0 | 163.1 | 861.0 | 641.7 | 181.8 | 814.4 | 577.3 | 200.5 | 767.8 | 551.6 | 207.9 | 749.1 |
| | 14 | 862.1 | 126.0 | 981.8 | 796.8 | 144.7 | 934.3 | 731.4 | 163.4 | 886.7 | 666.1 | 182.1 | 839.1 | 600.8 | 200.8 | 791.5 | 574.7 | 208.2 | 772.5 |
| | 13 | 889.4 | 126.3 | 1009.4 | 823.2 | 145.0 | 960.9 | 756.9 | 163.7 | 912.4 | 690.6 | 182.4 | 863.8 | 624.3 | 201.1 | 815.3 | 597.8 | 208.5 | 795.9 |

LCLT = Leaving Chilled Liquid Temperature HR = Heat Rejection

## PHYSICAL DATA

**TABLE 5**

| Model | | | 0395SB | 0455SB | 0515SB | 0585SB | 0675SB |
|---|---|---|---|---|---|---|---|
| Refrigerant circuits | | | 2 | 2 | 2 | 2 | 2 |
| Refrigerant Charge | Circuit 1 | kg | 45 | 55 | 55 | 65 | 65 |
| | Circuit 2 | kg | 45 | 55 | 55 | 65 | 65 |
| Oil Charge | Circuit 1 | l | 5 | 5 | 5 | 5 | 5 |
| | Circuit 2 | l | 5 | 5 | 5 | 5 | 5 |
| Compressor | Number | | 2 | 2 | 2 | 2 | 2 |
| | Type (circuit 1) | | DXS24L | DXS24L | DXS36L | DXS36L | DXS45L |
| | Nominal size | kW | 190 | 190 | 250 | 250 | 280 |
| | Type (circuit 2) | | DXS24L | DXS36L | DXS36L | DXS45L | DXS45L |
| | Nominal size | kW | 190 | 250 | 250 | 280 | 280 |
| | Capacity Control | % | 10 - 100% | 10 - 100% | 10 - 100% | 10 - 100% | 10 - 100% |
| Evaporator | Number | | 1 | 1 | 1 | 1 | 1 |
| | Type | | 549 | 631 | 631 | 790 | 790 |
| | Water volume | l | 140 | 133 | 133 | 230 | 230 |
| | Victaulic connection sizes (inches) | | 8 | | | | |
| Condenser | Number | | 1 | 1 | 1 | 1 | 1 |
| | Type | | D | F | F | H | H |
| | Water volume | l | 72 | 83 | 83 | 114 | 114 |
| | Victaulic connection sizes (inches) | | 4 | 5 | 5 | 6 | 6 |
| Weight | Operating | kg | 3300 | 3470 | 3520 | 4340 | 4380 |
| | Shipping | kg | 3170 | 3330 | 3390 | 4080 | 4110 |
| Dimensions | Length | mm | 3542 | 3572 | 3572 | 3585 | 3585 |
| | Width (including Control Panel) (1) | mm | 1075 | 1085 | 1085 | 1085 | 1085 |
| | Width (without Control Panel) | mm | 875 | 920 | 920 | 945 | 945 |
| | Height (2) | mm | 1787 | 1820 | 1820 | 1957 | 1957 |
| Reference sound level to EN 292 1991 (3) | | dBA | 91 | 91 | 91 | 91 | 91 |

(1) Width does not include switch disconnect or circuit breaker handles.

(2) Add 152 mm to unit height when shipping skids are attached.

(3) Sound Pressure levels are 1000 mm from the Control Panel, at a height of 1.600 mm from the unit base. Levels may vary at different positions around the unit.

## ELECTRICAL DATA

**TABLE 6**

| Electrical System 1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model YCWS | Compressor 1 | | | | | | | | | |
| | Comp DXS | Nominal | | | Maximum | | | | S.D. L.R. | |
| | | Kw | Amps | | Kw | Amps | | | Amps | |
| | | | 380V | 400V | | 342V | 380V | 400V | 380V | 400V |
| **0395SB** | 24L | 48.0 | 88 | 89 | 64.5 | 122 | 115 | 112 | 217 | 228.4 |
| **0455SB** | 24L | 48.0 | 88 | 89 | 64.5 | 122 | 115 | 112 | 217 | 228.4 |
| **0515SB** | 36L | 65.0 | 116 | 116 | 92.0 | 175 | 160 | 157 | 267 | 281.1 |
| **0585SB** | 36L | 65.0 | 116 | 116 | 92.0 | 175 | 160 | 157 | 267 | 281.1 |
| **0675SB** | 45L | 71.5 | 124 | 126 | 104.0 | 198 | 180 | 174 | 267 | 281.1 |

| Electrical System 2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model YCWS | Compressor 2 | | | | | | | | | |
| | Comp DXS | Nominal | | | Maximum | | | | S.D. L.R. | |
| | | Kw | Amps | | Kw | Amps | | | Amps | |
| | | | 380V | 400V | | 342V | 380V | 400V | 380V | 400V |
| **0395SB** | 24L | 48.0 | 88 | 89 | 64.5 | 122 | 115 | 112 | 217 | 228.4 |
| **0455SB** | 36L | 65.0 | 116 | 116 | 92.0 | 175 | 160 | 157 | 267 | 281.1 |
| **0515SB** | 36L | 65.0 | 116 | 116 | 92.0 | 175 | 160 | 157 | 267 | 281.1 |
| **0585SB** | 45L | 71.5 | 124 | 126 | 104.0 | 198 | 180 | 174 | 267 | 281.1 |
| **0675SB** | 45L | 71.5 | 124 | 126 | 104.0 | 198 | 180 | 174 | 267 | 281.1 |

Data given is for Multi Point Power Supply Connection, for Single Point Power Supply Connection the data given for System 1 and System 2 should be added together.

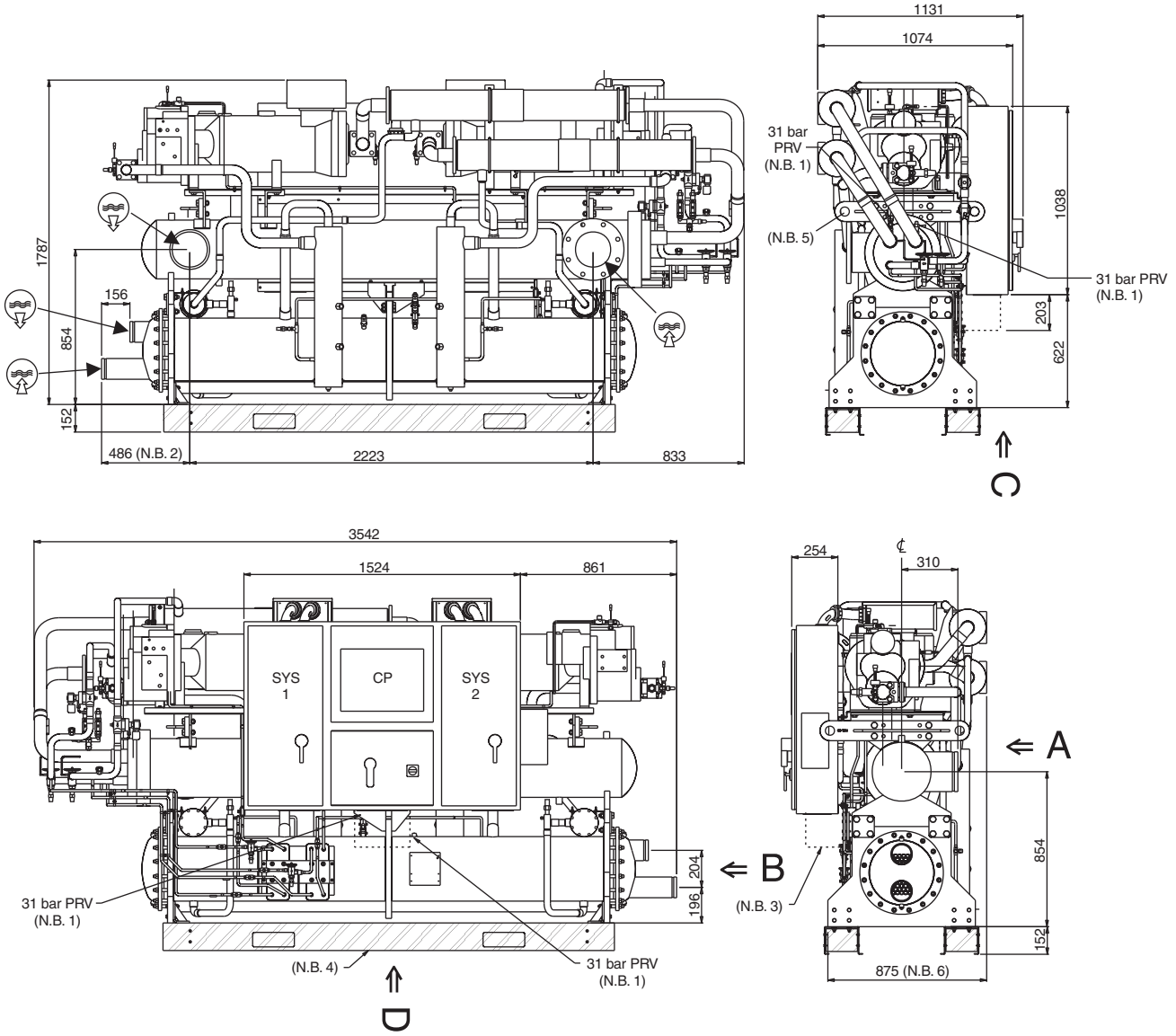
Nominal Running kW per compressor is at 7°C leaving chilled liquid temperature and 35°C leaving condenser water.

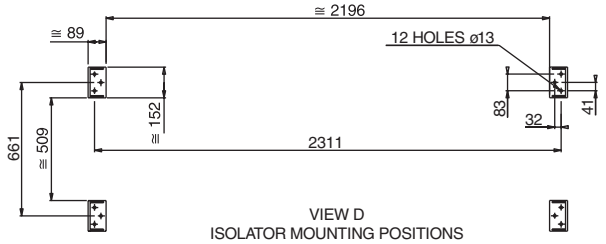
Maximum Running kW per compressor is at 15°C leaving chilled liquid temperature and 52°C leaving condenser water.

S.D. L.R. (Locked Rotor) Amps is the maximum in-rush current when Star Delta starting is employed.

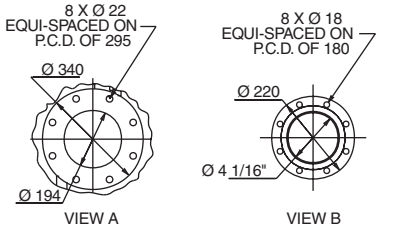
## FIGURE 4 DIMENSIONS

**YCWS Model 0395SB**



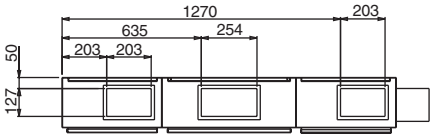




VIEW D
ISOLATOR MOUNTING POSITIONS




VIEW A
OPTIONAL COOLER CONNECTIONS
(shown on drawing)

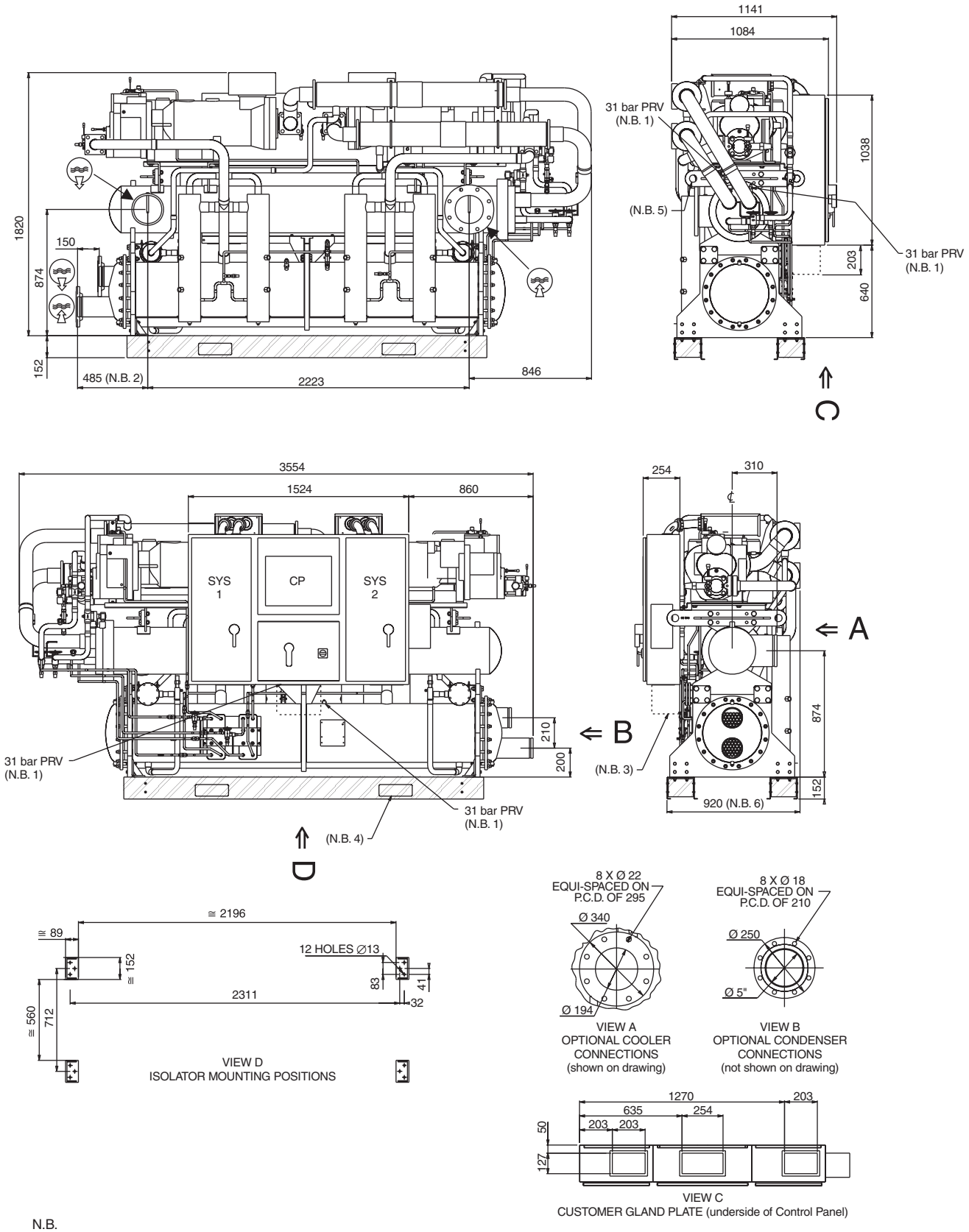
VIEW B
OPTIONAL CONDENSER CONNECTIONS
(not shown on drawing)




VIEW C
CUSTOMER GLAND PLATE (underside of Control Panel)

N.B.
1. Cooler and condenser are fitted with single pressure relief valves (PRV) as standard. Dual PRV on the cooler and condenser are available as an option.
2. Add 6 mm to dimension when DIN flanges are fitted to condenser.
3. Optional customer cable extension box.
4. Shipping skid with fork lift slots to be removed during installation.
5. Lifting holes located on removeable bars.
6. Unit width without panel.

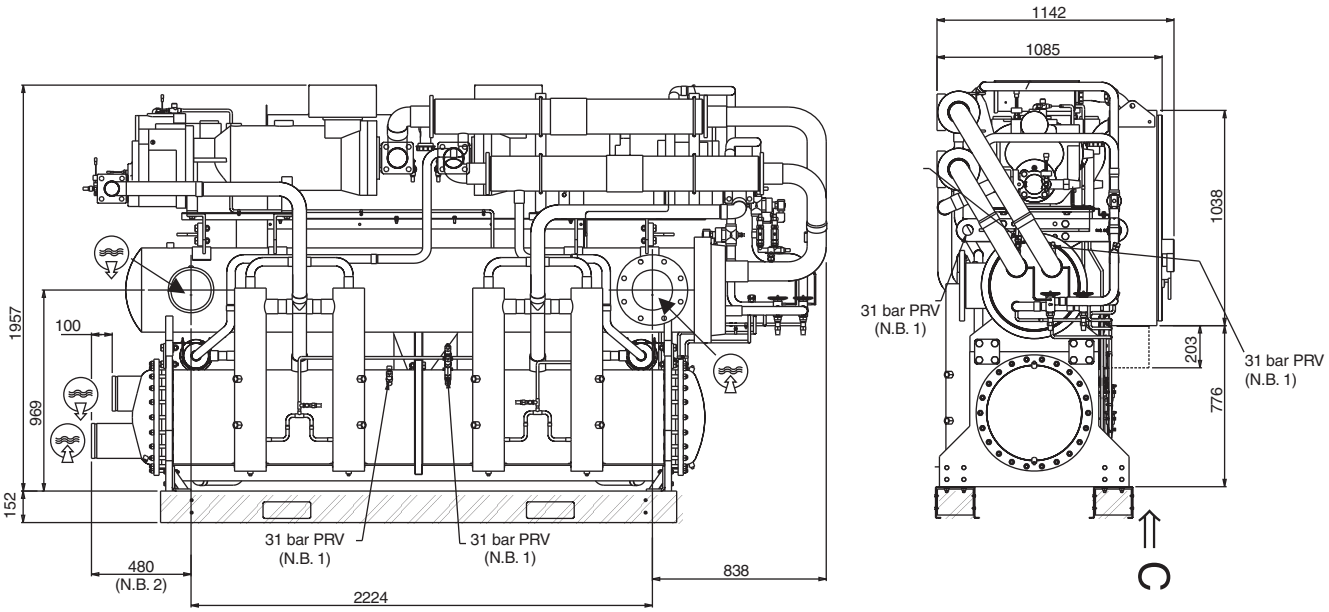
**YCWS Model 0455SB and 0515SB**

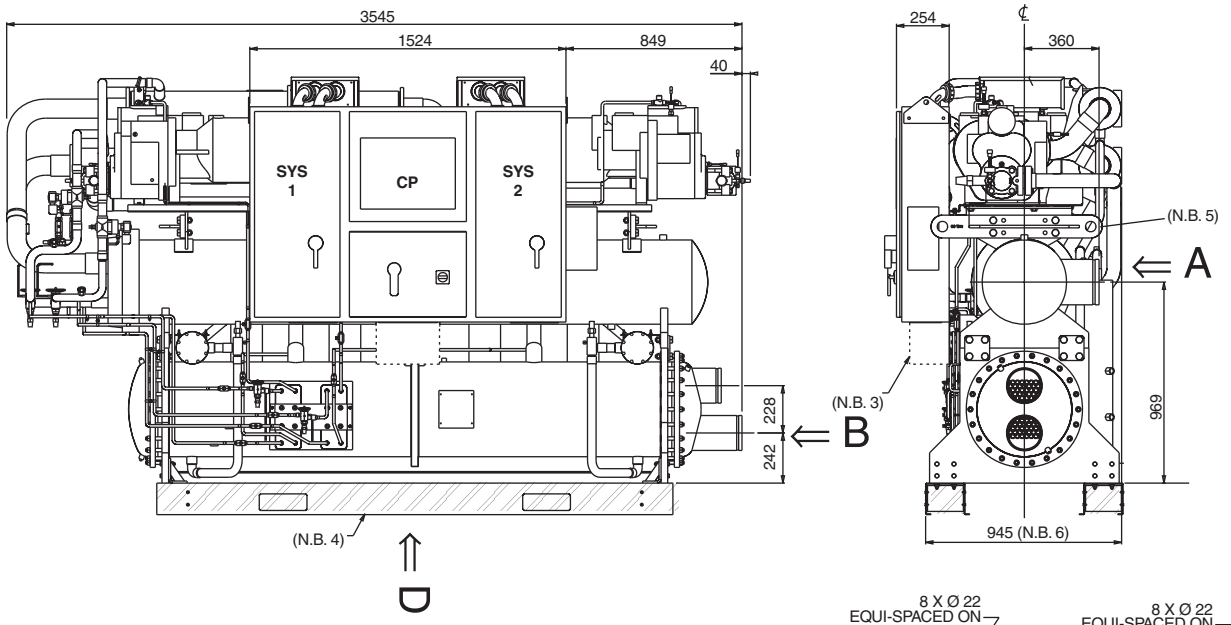


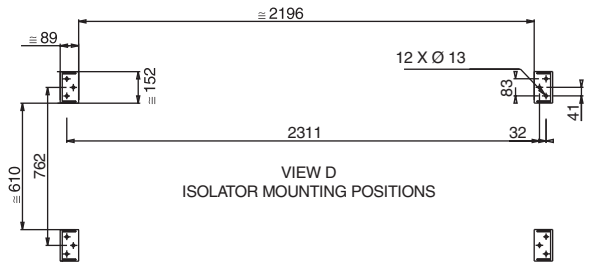

N.B.

1. Cooler and condenser are fitted with single pressure relief valves (PRV) as standard. Dual PRV on the cooler and condenser are available as an option.
2. Add 10 mm to dimension when DIN flanges are fitted to condenser.
3. Optional customer cable extension box.
4. Shipping skid with fork lift slots to be removed during installation.
5. Lifting holes located on removeable bars.
6. Unit width without panel.

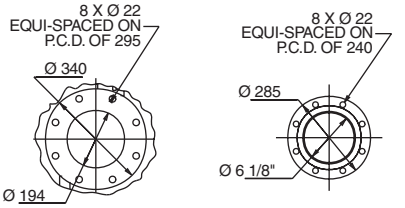
**YCWS Models 0585SB and 0675SB**



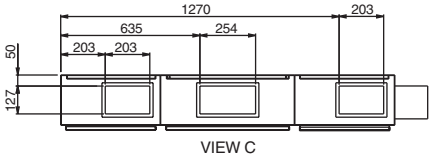




VIEW D
ISOLATOR MOUNTING POSITIONS



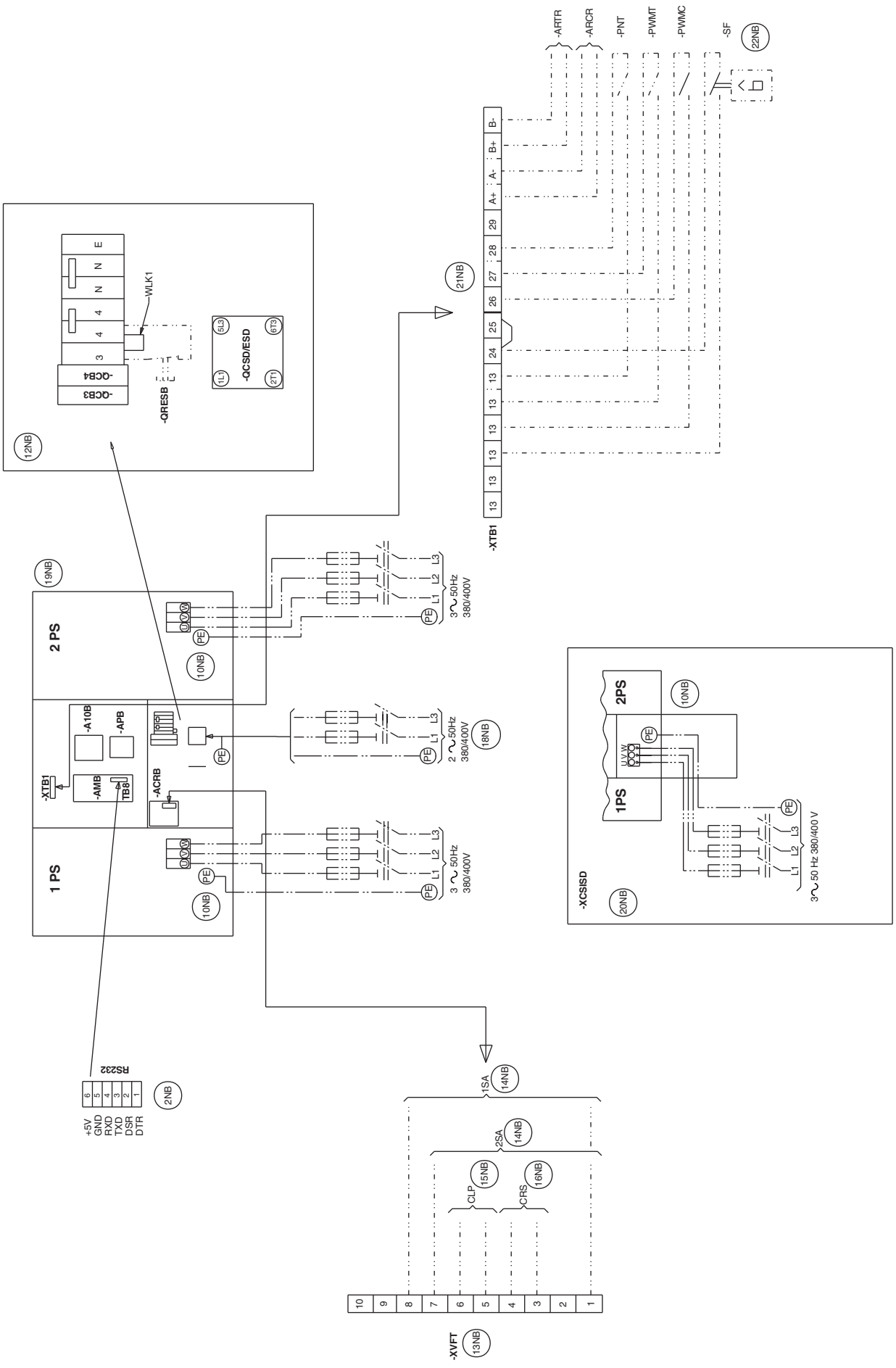

VIEW A
OPTIONAL COOLER
CONNECTIONS
(shown on drawing)

VIEW B
OPTIONAL CONDENSER
CONNECTIONS
(not shown on drawing)




VIEW C
CUSTOMER GLAND PLATE (underside of Control Panel)

N.B.
1. Cooler and condenser are fitted with single pressure relief valves (PRV) as standard. Dual PRV on the cooler and condenser are available as an option.
2. Add 6 mm to dimension when DIN flanges are fitted to condenser.
3. Optional customer cable extension box.
4. Shipping skid with fork lift slots to be removed during installation.
5. Lifting holes located on removeable bars.
6. Unit width without panel.


-ARTR
-ARCR
-PNT
-PWMT
-PWMC
-SF
22NB
B-
B+
A-
A+
29
28
27
26
25
24
13
13
13
13
13
13
21NB
-XTB1
12NB
E
N
N
4
4
3
WLK1
-QCB4
-QCB3
-QRESB
-QCSD/ESD
5L3
6T3
1L1
2T1
19NB
2 PS
10NB
3 ~ 50Hz
380/400V
L1
L2
L3
PE
-A10B
-APB
-XTB1
-AMB
TB8
-ACRB
18NB
2 ~ 50Hz
380/400V
1 PS
10NB
3 ~ 50Hz
380/400V
-XCSISD
2PS
10NB
1PS
U V W
20NB
3 ~ 50 Hz 380/400 V
RS232
6
5
4
3
2
1
+5V
GND
RXD
TXD
DSR
DTR
2NB
1SA
14NB
2SA
14NB
CLP
15NB
CRS
16NB
10
9
8
7
6
5
4
3
2
1
-XVFT
13NB

# CONNECTION DIAGRAM LEGEND AND NOTES

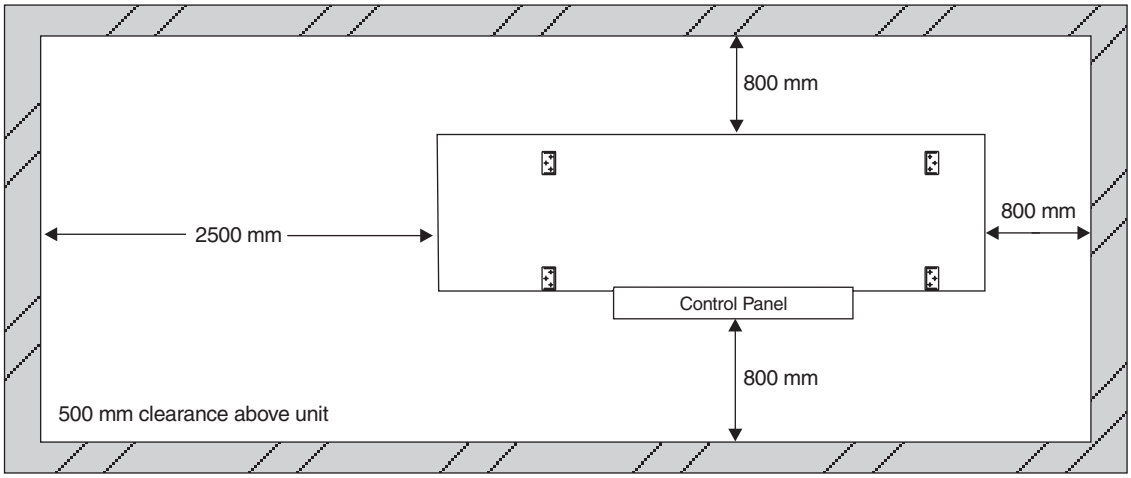
| DESIGNATION | DESCRIPTION |
|---|---|
| - ACRB | CUSTOMER RELAY BOARD |
| - AIOB | INPUT OUTPUT BOARD |
| - AMB | MICROPROCESSOR BOARD |
| - APB | POWER BOARD |
| - ARCR | REMOTE CURRENT RESET |
| - ARTR | REMOTE TEMPERATURE RESET |
| CLP | CHILLED LIQUID PUMP |
| CRS | COMMON RUN SIGNAL |
| CSI | COMMON SUPPLY INPUT |
| PE | PROTECTIVE EARTH |
| PNT | PRINT |
| PS | POWER SECTION |

| DESIGNATION | DESCRIPTION |
|---|---|
| PWMC | PULSE WIDTH MODULATED CURRENT |
| PWMT | PULSE WIDTH MODULATED TEMPERATURE |
| - QCB | CIRCUIT BREAKER |
| - QCSD /ESD | CONTROL CIRCUIT SWITCH DISCONNECTOR / EMERGENCY STOP DEVICE |
| - QCSISD | COMMON SUPPLY INPUT SWITCH DISCONNECT |
| - QRESB | REMOTE EMERGENCY STOP BUTTON |
| - QSDF | SWITCH DISCONNECT FUSED |
| SA | SYSTEM ALARM |
| - SF | FLOW SWITCH |
| - XVFT | VOLTAGE FREE TERMINAL BLOCK |

| NB | Notes |
|---|---|
| 2 | This port can be used for a printer - see Microprocessor Based Control System Operating Instructions for warnings and limitations on use for this port. |
| 10 | A. PE connection for units with multi point power supply option. |
| | B. PE connection for units with single point power supply option. |
| 12 | For remote emergency stop button (-QRESB) facility, remove link WLK1,and connect contact across terminals 3 and 4. |
| 13 | All wiring to power section voltage free contacts requires a supply provided by the customer maximum voltage 240 V. The customer must take particular care when deriving the supplies for the voltage free terminals with regard to a common point of isolation. Thus, these circuits when used must be fed via the common point of isolation. The voltage to these circuits is removed when the common point of isolation to the unit is opened. This common point of isolation is not supplied by York. The York voltage free contacts are rated at 125 VA. All inductive devices (relays) switched by the York voltage free contacts must have their coil suppressed using standard R/C suppressors. |
| 14 | To obtain a system alarm signal, connect live to terminal 1 and use terminal 8 for No.1 system alarm and terminal 7 for No.2 system alarm. |
| 15 | Wire terminals 5 and 6 to chilled liquid pump starter, so that when the circuit between 5 and 6 is closed, the pump must run. Contact can be used as master start/stop for pump when daily schedule test. |
| 16. | Wire terminals 3 and 4 to indicate that any systems are running. Contacts may be wired to condenser pump/fan starter, so that when the circuit between 3 and 4 is closed the pump/fan must run. |
| 18 | Control system power supply for units with multi point power supply option. |
| 19 | No controls (relays etc.) should be mounted in any section of the control panel. Additionally, control wiring not connected to the York control panel should not be run through the panel. If these precautions are not followed, electrical noise could cause malfunctions or damage to the unit and its controls. |
| 20 | For single point supply connect as shown enclosed detail. Overriding the standard connections. |
| 21 | Use gland plate on back of logic section to avoid power cables. The voltage free contacts must be suitable for 30 Vdc (gold contacts recommended). If voltage free contact forms part of a relay or contactors, the coil of this device must be suppressed by the customer using a standard R/C suppressor.<br>The above precautions must be taken to avoid electrical noise which could cause a malfunction or damage to the unit and its controls. |
| 22 | Connect chilled liquid flow switch as shown to provide adequate protection against loss of flow. |

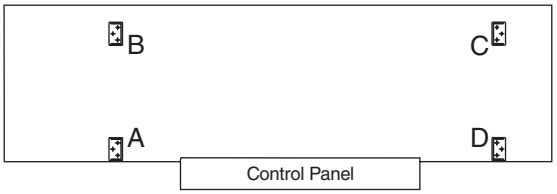
## CLEARANCES

The recommended clearances below are the distances between the edge of the unit and the architectural enclosure surrounding the unit. The clearances allow for access of the control panel and for component removal.




## WEIGHT DISTRIBUTION

| Location | YCWS | | | | |
|---|---|---|---|---|---|
| | **0395SB** | **0455SB** | **0515SB** | **0585SB** | **0675SB** |
| A | 957 | 1006 | 1021 | 1259 | 1270 |
| B | 891 | 937 | 950 | 1172 | 1183 |
| C | 693 | 729 | 739 | 911 | 920 |
| D | 759 | 798 | 810 | 998 | 1007 |
| **TOTAL** | **3300** | **3470** | **3520** | **4340** | **4380** |



# NOTES